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SUMMARY

Uruguay's national sheep performance recording scheme (Flock-Testing Service) is described. Recent developments of the scheme are discussed. The scheme is implemented and supervised by the Uruguayan Wool Secretariat (SUL). Centralization of responsabilities by SUL and continued co-participation of breeders and scientists are identified as the main factors contributing to the scheme's success. It is suggested that Uruguay's Flock-Testing Service combines traditional and scientific breeding methods in a balanced manner, thus assisting with the improvement of the genetic merit of the national flock.

INTRODUCTION

Sheep production in Uruguay is based upon grazing of natural (90 per cent) and improved (10 per cent) pastures in association with beef cattle (Azzarini and Ponzoni, 1971). The present sheep population is estimated at 25 million and the predominant breeds are Corriedale, Polwarth and Merino, which represent 70, 11 and 6 per cent of the national sheep flock, respectively (Nicola, et al, 1984). These breeds can be defined as multiple purpose (Ponzoni, 1985) in the sense that they generate income from the sale of wool and sheep meat (surplus offspring and cast for age animals), forcing breeders to consider several traits in their selection programmes. However, wool is the main product of the system, accounting for between 60 and 80 per cent of the total sheep income (Cardellino and Oficialdegui, 1981).

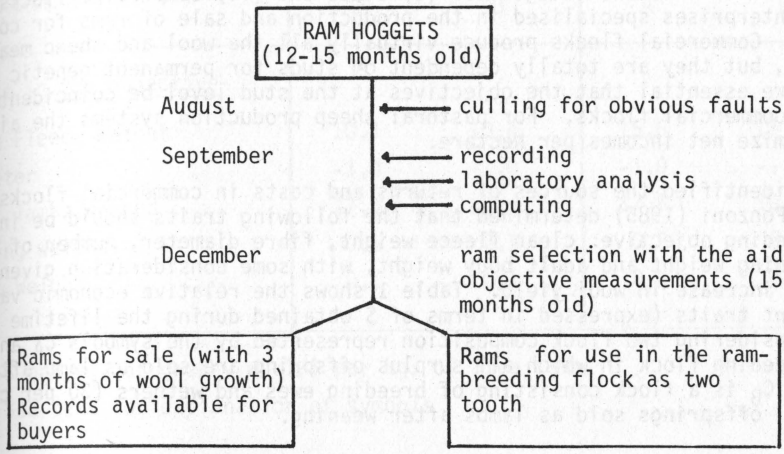
In this paper we describe Uruguay's performance recording scheme for sheep. We present its development to its present stage with a historical perspective, and we discuss options recently made available in the scheme.

THE FLOCK-TESTING SERVICE - URUGUAY'S NATIONAL PERFORMANCE RECORDING SCHEME FOR SHEEP

Uruguay's national performance recording for sheep is known as the Flock-Testing Service. It has been in operation since 1969 and it is implemented and supervised by the Uruguayan Wool Secretariat (SUL). It services multiple purpose breeds and it was developed with the aim of introducing objective measurements of important production traits in sheep selection programmes (Cardellino, 1976).

am hoggets (registered or unregistered) without obvious faults and shorn as lambs re recorded when they are 12-15 months old. At shearing time (September-October) reasy fleece weight, live weight and a visual appraisal of the quality number, cha acter and colour of the wool are recorded. It is optional to record the type of irth (single or twin, progeny of 2 tooth or adult ewes) and also the identifica- ion of the sire. A mid side sample of wool is taken and sent to SUL's laboratory here scouring yield, staple length and average fibre diameter are determined. Da- a are processed by computer and returned to the breeder in November-December when e carries out the final selection of rams and decides which will be used in the am breeding flock and which will be sold. These will have 3 to 4 months of wool nd production records available to buyers (Figure 1).

FIGURE 1: FLOCK-TESTING SERVICE



or the service to be effective it is essential that all laboratory and computer ork be performed between September and December. Laboratory analyse of scouring ield, fibre diameter and staple length are conducted only on 60 per cent of the ams with the highest greasy fleece weights, with a minimum of 50 samples analyzed er stud. This reduces considerably the laboratory work and consequently the cost f the service which is completely free for the user.

ams are ranked according to their clean fleece weights, other traits being expres- ed as deviations from the average of the lot. When type of birth is recorded, cor ection factors for fleece and live weight are utilized. When sire identification s available, a sire summary is produced but it is often of limited value because f non-random assignment of ewes to individual rams at mating.

he final selection is usually performed by using independent culling levels with mphasis normally being placed on clean fleece weight and live weight, with some estrictions in fibre diameter and wool quality.

mphasis placed on different characteristics has been variable among breeders. At imes some traits acquired great importance in the mind of breeders (e.g. size), espite the lack of a sound basis for that attitude.

It gradually became obvious that a formal definition of the breeding objectives and of selection criteria was essential. It was recognised that such a formal definition would enable us to determine more precisely the relative importance of the traits (thus avoiding unnecessary emphasis on unimportant traits) and also to offer breeders the possibility of combining various selection criteria in an index.

DEFINITION OF BREEDING OBJECTIVES

Unless breeding objectives are clearly defined, there is a considerable amount of scope for various interpretations of what the desired improvement might be (Ponzoni, 1982). The considerations of a breed as multiple or dual purpose does not constitute a formal definition of breeding objectives. The breeding structure in Uruguay follows the common hierarchical pattern. In simple terms, sheep flocks can be classified into two categories: (i) Studs and (ii) Commercial flocks. Studs are sheep enterprises specialised in the production and sale of rams for commercial flocks. Commercial flocks produce virtually all the wool and sheep meat in the country, but they are totally dependent on studs for permanent genetic gain. It is therefore essential that the objectives at the stud level be coincident with those of the commercial flocks. For pastoral sheep production systems the aim should be to maximize net incomes per hectare.

Having identified the sources of returns and costs in commercial flocks, Cardellino and Ponzoni (1985) determined that the following traits should be included in the breeding objective: clean fleece weight, fibre diameter, number of lambs weaned, weaning weight and adult body weight, with some consideration given to an excessive increase in wool yield. Table 1 shows the relative economic values of the different traits (expressed in terms of $ obtained during the lifetime of the animal) considering two flock composition represented by the symbols C_A and C_B. C_A is a breeding flock in which all surplus offspring are sold as lamb after weaning, whereas C_B is a flock consisting of breeding ewes and wethers (30 per cent) with surplus offsprings sold as lambs after weaning.

Also two different wool/meat price ratios ($ per kg. of greasy wool/$ per kg. of live lamb) were considered: 4/1 (Corriedale) and 6/1 (Merino and Polwarth).

The method utilized in the calculation of the economic values was developed by Morris et al (1979) and Ponzoni (1979). They represent the marginal net income derived as a consequence of increasing one unit (1 kg. of fleece, 1 micron, 1 weaned lamb, etc.) during the lifetime of the animal in the flock.

Allowances were made for the costs of increased feed intake which would result as a consequence of the genetic improvement in reproduction rate and weaning weight and also for the maintenance of heavier ewes and wethers. This approach has the limitations pointed out by James (1982) and it is anticipated that refinements in the procedures used in the deviation of economic values will be introduced in the future.

Table 1: Relative economic values of the traits in the breeding objective for different breeds and flock compositions (C_A and C_B)

BREEDS	CORRIEDALE		POLWARTH MERINO	
Wool/meat price ratio (+)	4/1		6/1	
Flock Composition (#)	C_A	C_B	C_A	C_B
Traits in the objective				
Clean Fleece Weight	10,4	10,4	15,6	15,6
Diameter	-1,0	-1,0	-1,0	-1,0
N° of lambs weaned	17,6	10,9	17,6	10,9
Weaning weight	0,5	0,1	0,5	0,5
Adult Weight	0,1	0,1	0,1	0,1

(+) $ per kg. of greasy wool/$ per kg. of live lamb

(#) See text for explanation of symbols

SELECTION INDICES

Selection indices were calculated using the computer programme SELIND (Cunningham and Mahon, 1977). The heritability values and phenotypic and genetic correlations assumed among traits represent "admissible" values found in the literature for these breeds. There is a lack of information on genetic and phenotypic parameters at a national level, but as shown by Ponzoni (1982) within certain limits of variation in the parameters utilized, the consequences on the final results are small.

Table 2 and 3 show selection indices for Corriedale and fine wool breeds (Polwarth and Merino) with the two flock compositions (C_A and C_B) described earlier (Cardellino and Ponzoni, 1985). Indices I_1 and I_2 include detailed wool measurements (yield and diameter) so they are suitable mainly for rams. Indices I_3 and I_4 do not require laboratory analysis and are suitable for ewes.

The accuracy (r_{IH}) of those indices which include clean fleece weight and fibre diameter is always greater than for those which do not. Given the parameter values assumed, recording a dam's number of lambs weaned (that is, whether the animal was reared as a simple or twin) contributes little to the accuracy of the index, measured by the values of r_{IH}. Similar results were reported by Ponzoni and Walkley (1984) although the identification of single and twin born animals would enable the use of correction factors and avoid the discrimination against twins.

Table 2: Selection indices and correlations (r_{IH}) between indices and breeding objectives for Corriedales with two flock compositions.

SELECTION CRITERIA	FLOCK COMPOSITION C_A				C_B			
	I_1	I_2	I_3	I_4	I_1	I_2	I_3	I_4
Clean Fleece Weight	6.9	6.9	-	-	11.2	11.2	-	-
Greasy Fleece Weight	-	-	3.2	3.2	-	-	5.6	5.6
Diameter	-0.9	-0.9	-	-	-1.4	-1.4	-	-
N° of lambs weaned	1.5	-	1.5	-	1.5	-	1.6	-
Hogget Weight	0.3	0.3	0.3	0.3	0.1	0.1	0.2	0.2
r_{IH}	0.53	0.52	0.34	0.34	0.58	0.58	0.35	0.34

Table 3: Selection indices and correlations (r_{IH}) between indices and breeding objectives for Polwarth and Merino, with two flock compositions.

SELECTION CRITERIA	FLOCK COMPOSITION C_A				C_B			
	I_1	I_2	I_3	I_4	I_1	I_2	I_3	I_4
Clean Fleece Weight	10	10	-	-	16.3	16.7	-	-
Greasy Fleece Weight	-	-	6	6	-	-	10	10
Diameter	-0.8	-0.8	-	-	-1.1	-1.2	-	-
N° of lambs weaned	1.5	-	1.6	-	1.6	-	1.6	-
Hogget Weight	0.2	0.2	0.3	0.3	0.1	0.1	0.2	0.2
r_{IH}	0.56	0.55	0.40	0.39	0.59	0.59	0.41	0.41

hose production systems where the relative economic value of wool in the breed objective is greater (Polwarth and Merino breeds and flock composition C_B) for ven index (I_1 to I_4), the values of r_{IH} are higher, in other words the indices better predictors of the objective.

ce the last season, optional selection indices for each breed have been included SUL's Flock-Testing reports but there was a general agreement among scientists breeders about the desirability of continuing to present the information on all individual traits recorded. Even if selection procedures are not always carried by means of selection indices, the formal definition of breeding objectives is y useful for the industry in clarifying the relative economic importance of the its.

EVALUATION OF THE FLOCK-TESTING SERVICE

evaluation of the effectiveness of the service in terms of the number and relave importance of studs involved, the degree of continuity, the proportion of anals recorded and the interpretation and use of the data has been made by Cardefino (1982).

ere has been a continuous increase in the nomber of studs using the Flock-Testing rvice from 12 in 1969 to 125 in 1984 (89 Corriedale, 21 Polwarth, 9 Merino, 6 Merlin). The total number of rams recorded in 1984 was 12000 which represents approximately one third of the rams needed for replacements in the commercical flocks.

ith regards to the rate of adoption by the most important studs in terms of dismination of genetic improvement to the industry, results obtained so far are very encouraging (90 per cent for Corriedale, 70 per cent for Polwarth).

e believe this is partly fue to the strategy adopted in the implementation and opration of the Flock-Testing Service, with special emphasis placed in some aspects, mely:

In the development of the Flock-Testing Service an effort was made to present it as a complement to the traditional system (with the necessary modifications) rather than as a substitute.

Also an active involvement of the breeders in the development of the national breeding programmes was sought and a permanent co-participation of scientists and breeders. The Flock-Testing Service is run by SUL through its research and extension departments, with representatives of all the sheep breed associations. This contributes greatly to the support the program enjoys from breeders.

Finally, the centralisation of activities in one organisation has contributed to the scheme's success. SUL is responsible for the scientific support to the scheme, and also for related extension activities. It assist the stud breeders at shearing time in collecting records and taking wool samples. After the records have been processed it assists breeders in the interpretation and use of the information. Assistance is also given to ram buyers at stud's auction sales. Laboratory analysis of wool samples and computing work are also carried out by SUL.

Future activities of SUL include plans for the estimation of selection differentials and, if possible, of rates of genetic gain being achieved in the most important traits in studs using the Flock-Testing Service.

FINAL REMARKS

Traditional selection methods based on a subjective appraisal of the animals were successful during the early stages of Uruguay's sheep breeding history. These methods raised the genetic level of several production traits. The task was facilitated by the genetic variation present in traits readily assessed by visual appraisal (e.g. wool weight, body size), and the elimination of major faults. The role of the breeder continues being very important, but scientific knowledge can help breeders improve the genetic merit of their flocks at a faster rate. Uruguay's Flock-Testing Service represents an example of the way in which traditional and scientific breeding methods can be combined to improve the genetic merit of the national flock.

REFERENCES

Azzarini, M. and Ponzoni, R. (1971). Aspectos modernos de la producción ovina (Universidad de la República, Montevideo, Uruguay) pp 197

Cardellino, R.C. (1976) Sheep Breeding in Uruguay. Proc. Int. Sheep Breeding Congress. Mures,, Western Australia, 73-79

Cardellino, R.C. (1982) A ram performance - recording scheme in Uruguay. Proc. of the World Congress on Sheep and Beef Cattle Breeding. New Zealand. Vol. II, 31-6

Cardellino, R.C. and Oficialdegui, R.J. (1981). La importancia del tamaño de los ovinos en los sistemas de producción del Uruguay. Boletín Técnico N°10. SUL 11-16

Cardellino, R.C. and Ponzoni, R.W. (1985). Definición de los objetivos del mejoramiento genético e índices de selección en lanares. II Seminario Técnico de Producción Ovina. SUL, Agosto 1985, Salto, Uruguay.

Cunningham, E.P. and Mahon, G.A.T. (1977). Selind, a Fortram Computer Program for Genetic Selection Indexes. User's Guide.

James, J.W. (1982). Economic aspects of developing breeding objectives: general considerations. In: Future developments in the genetic improvement of animals, pp. 107-118 (Academic Press, Australia).

Morris, C.A., Clarke, J.N., Elliott, K.H., Johnson, D.L., and Bell, B.A. (1978). Objective for Sheep Improvement. In: New Zealand Sheep Production, Processing and Marketing, Vol. I, 143-67.

Nicola, D.F., Cardellino, R.C. and Oficialdegui, R.J. (1984). Relevamiento de la producción ovina en el Uruguay, 1980/1981, SUL. Departamento de Investigación de la Producción Ovina.

Ponzoni, R.W. (1979). Objectives and selection criteria for Australian Merino Sheep. Proc. Aust. Assoc. Anim. Breed. Genet. 1: 320-36

Ponzoni, R.W. (1982) Breeding objectives in sheep improvement programmes. Proc. 2nd. Wld. Congress Genet. Appl. Livest. Prod., Madrid, Vol V, 619-34

Ponzoni, R.W. (1985). Wool production in the context of overall genetic improvement of multiple purpose sheep. Paper presented at the Regional Meeting of Wool Science and Technology, Montevideo, Uruguay, Sept. 30 to Oct. 4, 1985.

Ponzoni, R.W. and Walkley, J.R.W. (1984). The economic importance of genetic improvement of reproductive rate in Australian Merino Sheep. In: Reproduction in Sheep, 378=81.